the first exposure of star No. 1. The same series of exposures are then given, and the plate developed. The result will be like this:—

The relative number of images of the two stars will give their magnitudes to 0·5. The times of exposures will vary as the number whose log. is 0·2, but there is no reason why they should not be made to give 0·1 magnitudes.

The contacts are made by a wooden disc, revolving uniformly by the driving clock of the equatoreal. On its edge are brass pins, which are placed so as to pass under a wiper at the correct intervals. The entire process is automatic once the star is set in its right place. Each plate will hold ten sets of exposures.

The instrument will also be of use for determining the actinic value of the sky before taking a stellar photograph. In this case, by taking a series of *Polaris*, and finding thus at what exposure it fails to record itself, the exposure necessary to record a star of another magnitude will be known.

Also, to determine the value of wire screens in front of the O.G., a series can be taken with and without the screen and the necessary value found.

I hope to exhibit some negatives taken with the instrument shortly before the Society.

1892 *January* 3.

The Red Stars in the Great Perseus Clusters.

By the Rev. T. E. Espin, B.A.

Although the fact that there are several red stars in G.C. 512,521 is well known, as far as I am aware their actual places have never been published, with the exception of one or two of the brighter ones. Herschell and D'Arrest each saw one, Smyth two, Birmingham three, Rev. T. W. Webb five, Rev. T. T. Smith eight. The "Observations of Nebulæ and Clusters at Birr Castle" (*Scientific Transactions of the Royal Dublin Society*, vol. ii., New Series, p. 27) mention five. As there seemed to be considerable divergence of opinion as to their number, the clusters were carefully examined on the nights of 1891 December 29 and 1892 January 1. The powers used were the sweeping power of 70, and a power of 200. The first night was remarkably fine, and the definition superb, and the sky intensely black. While examining the P cluster (G.C. 512) I had a strong suspicion that the N.P. part was nebulous. The eye-pieces were carefully cleaned,

and the telescope moved rapidly backwards and forwards, and a decided impression was left upon my mind that there is really some faint nebulosity in that part. The second night, January 1, the definition was poor, and no nebulosity was seen. No red stars were seen in G.C. 512, four lie between the clusters, three are found in G.C. 521, the remaining two among the outliers. The spectroscopic observation of the stars in the cluster is difficult, the spectra overlapping each other. The stars are all third type, and very similar to one another; the colours are nearly similar, the magnitudes also. The following table gives the D.M. number of the stars, the place, the D.M. magnitude, the observed magnitude, and the spectrum :—

	D.M.	R.A. 11 h.	(1855) Decl.	Magnitude. D.M.	Magnitude. Observed.	Colour.	Spect.
		m s	° ′				
(1)	+56 512	8 40	+56 45·2	9·0	8·8	OR	III.
(2)	56 547	10 19	56 19·4	8·2	7·6	OR′	III.!
(3)	56 551	10 45	56 29·3	8·2	7·8	OR	III.
(4)	57 550	11 26	57 11·1	8·5	8 5	OR	III.
(5)	55 597	11 58	55 56·2	8·2	7·0	OR	III.!
(6)	56 583	12 12	56 26·3	8·6	8·2	OR′	III.
(7)	56 595	12 57	56 32·0	8·5	8·4	OR′	III.
(8)	56 597	13 9	56 32·7	8·6	8·5	OR	III.!
(9)	56 609	15 3	56 46·8	8·4	8 8	OR	III.!

It is obvious that the observed magnitudes are overrated, and, rejecting No. 2 and No. 5, a correction of +0·2 is found. No. 2 seems to be actually underrated in Argelander. Mr. Pihl, in *The Stellar Cluster* χ *Persei*, makes it 7·8, and in the *Neue Annalen der k. Sternwarte in Bogenhausen*, Band ii., in a study of 38h. *Persei*, Dr. Oertel gives it as 7·6. As regards the star No. 5, I suspect from the great difference of magnitude that it may be variable. The first observation of it was on December 22, when it was rated as 7·0; on December 29 it was again observed, and compared with No. 2, when it was estimated as 7·4. On both nights the fainter stars were carefully examined, and, had there been any other red star above magnitude 10·5, it could not have escaped detection.

Tow Law:
1892 *January* 6.

On the Phenomenon of the Transit of the First Satellite of Jupiter 1890 September 8, and Observations of the Red Spots on the Planet. By E. E. Barnard, M.A.

In a letter which I have received from Mr. A. Stanley Williams he informs me that he has sent a communication to the Royal Astronomical Society in which he endeavours to explain the apparent duplicity of the first satellite of *Jupiter* at its transit 1890 September 8, by supposing the phenomenon to have been a close conjunction of the satellite with a small spot which he had seen three days earlier on the planet.

Leaving aside the fact that it is wholly improbable that two experienced observers should have been so mistaken in a matter of this kind, I would say that the phenomenon of apparent duplicity was watched for upwards of half an hour before the visitors interrupted (from before sidereal $18^h\ 30^m$ to about $19^h\ 7^m$), part of which time Mr. Burnham observed with me. During that interval no relative motion was detected. At the transit of I, the relative motion of the satellite and a spot on *Jupiter* would have amounted to $0''{\cdot}15$ each minute of time—a displacement which would have been only too apparent in a few minutes with the 12-inch and the high magnifying power employed. It is, therefore, apparent that Mr. Williams's explanation can have no bearing on the apparent duplicity of Satellite I at its transit 1890 September 8.

I consider the observation of the double transit an important one, the explanation of which will perhaps be still more important.

It should be accepted as unquestionable that the phenomenon of 1890 September 8 was wholly connected with the satellite. One or the other of the two probable explanations which I have given in *Monthly Notices*, No. 9, vol. li., will doubtless be found in the end to be the true solution of the matter. It is unfortunate that the transits of this object still occur over a dark portion of *Jupiter*. As soon as these are transferred to a bright region we may expect to know something more definite.

The New Red Spot in the Southern Hemisphere.

The new red spot, which has been such a striking feature in the southern hemisphere of *Jupiter* during the past opposition, has disappeared. About the last of October it was the most prominent feature on the planet. It was well defined and of a clear red, very much resembling in distinctness and colour the appearance of the great red spot in 1880. In the first part of November it began to fade quite rapidly, and by the 20th was scarcely discernible.